

APPENDIX B

**FINAL
PROJECT-SPECIFIC HEALTH AND SAFETY PLAN
FOR
IN SITU VOLATILIZATION
SUBSURFACE INTERIM
MEASURES/INTERIM
REMEDIAL ACTION
EAST TRENCHES AREA**

OPERABLE UNIT NO. 2

U.S. DEPARTMENT OF ENERGY

**Rocky Flats Plant
Golden, Colorado**

ENVIRONMENTAL RESTORATION PROGRAM

14 May 1993



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HEALTH AND SAFETY PLAN

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ER Health and Safety Officer

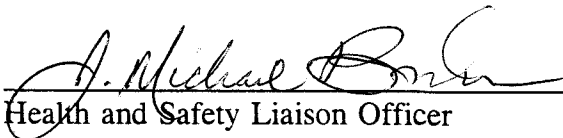
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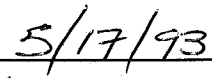
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2

TABLE OF CONTENTS

Section	Title	Page
SECTION B 1	INTRODUCTION	B 1-1
SECTION B 2	<i>In Situ</i> SOIL VAPOR SURVEY PERSONNEL	B 2-1
SECTION B 3	SITE DESCRIPTION	B 3-1
SECTION B 4	SOIL VAPOR SURVEY METHODS	B 4-1
SECTION B 5	HAZARD ASSESSMENT	B 5-1
	B 5.1 Physical Hazards	B 5-1
	B 5.2 Chemical Hazards	B 5-3
	B 5.3 Radiological Hazards	B 5-4
	B 5.3.1 Radiological Monitoring and Screening	B 5-5
	B 5.4 Biological Hazards	B 5-6
SECTION B 6	MONITORING	B 6-1
SECTION B 7	EXPOSURE SYMPTOMS AND ACTION REQUIRED	B 7-1
SECTION B 8	PERSONAL PROTECTIVE EQUIPMENT	B 8-1
SECTION B 9	WORK ZONES	B 9-1
SECTION B 10	DECONTAMINATION	B 10-1
	B 10.1 Personnel	B 10-1
	B 10.2 Field Monitoring Equipment	B 10-1
	B 10.3 Rental Equipment	B 10-1
	B 10.4 Vehicles	B 10-1
SECTION B 11	TRAINING REQUIREMENTS	B 11-1
SECTION B 12	MEDICAL MONITORING REQUIREMENTS	B 12-1
SECTION B 13	CONTINGENCY PLANS	B 13-1
SECTION B 14	UNDERSTANDING AND COMPLIANCE STATEMENT .	B 14-1
SECTION B 15	REFERENCES	B 15-1

TABLE OF CONTENTS

LIST OF TABLES

<u>Table</u>	<u>Title</u>	<u>Page</u>
B 5-1	Local Air Monitoring Trigger Levels to 239 Plutonium in Soils	B 5 6
B 6-1	Monitoring	B 6-1
B 7-1	Exposure Symptoms and Action Required	B 7-1
B 8-1	Personal Protective Equipment	B 8-1
B 11-1	Training Requirements	B 11-1

LIST OF FIGURES

<u>Figure</u>	<u>Title</u>	<u>Page</u>
B 3-1	Proposed <i>In Situ</i> Vapor Extraction Sites, Operable Unit No. 2	B 3-2
B 4-1	Schematic Diagram of Typical Single Well Vent System	B 4-3

TABLE OF CONTENTS

LIST OF ACRONYMS

ALARA	as low as reasonably achievable
CFR	Code of Federal Regulations
CRZ	Contamination Reduction Zone
DAC	Derived Air Concentration for Radionuclides
dBA	decibels on the "A" weighted scale
DOT	Department of Transportation
EMRG	Environmental Management Radiological Guidelines
ER	Environmental Restoration
EZ	Exclusion Zone
GAC	granular activated carbon
hr	hours
HSL	Health And Safety Liaison
HSP	Rocky Flats Health and Safety Practices Manual
HSS	Health And Safety Specialist
IHSS	Individual Hazardous Substance Site
ISV	<i>in situ</i> volatilization
KV	kilovolt
mrem	one thousandth of a rem
OU2	Operable Unit No. 2
OSHA	Occupational Safety and Health Administration or Act
PCE	tetrachloroethylene (perchloroethylene)
PEL	permissible exposure limit
PID	photoionization detector
PPE	personal protective equipment
PSHSP	Project-Specific Health And Safety Plan
RCA	Radiological Controlled Area
rem	radiation equivalent man - a unit of adsorbed dose
RFP	Rocky Flats Plant
RPT	Radiation Protection Technician
SHSC	Site Health And Safety Coordinator
SOP	Standard Operating Procedure
SZ	Support Zone
TBD	to be determined
TCA	1,1,1-trichloroethane
TCE	trichloroethylene
TSP	total suspended particulate matter
VOC	volatile organic compounds

SECTION B 1

INTRODUCTION

This Project-Specific Health and Safety Plan (PSHSP) provides detailed health and safety guidance for a project planned to investigate *in situ* volatilization (ISV) at the East Trenches Areas at the Rocky Flats Plant (RFP).

It is written as an addendum to the previously approved health and safety plan issued by EG&G Rocky Flats, Inc. (EG&G) for environmental work at Operable Unit No. 2 (OU2) entitled "Health and Safety Plan for Phase II RCRA Facility Investigation/ Remedial Investigation at the 903 Pad, Mound, and East Trenches Areas."

This PSHSP will become final when it is completed and/or modified by the contractor hired to conduct the work, and subsequently approved by EG&G. Items necessary to complete this PSHSP include:

- A specific listing of the contractor's project manager and site health and safety coordinator (SHSC) including their relevant credentials.
- Also a specific listing is needed for a Health And Safety Specialist (HSS). The Health and Safety Specialist is the individual responsible for performing health and safety monitoring in the field. This work must be performed in compliance with Environmental Management Radiological Guidelines (ERMG). The Health and Safety Specialist must be experienced in performing health and safety monitoring and must be approved by EG&G Radiological Engineering and EG&G Industrial Hygiene.
- Clarification and approval of the contractor's emergency response and medical surveillance programs including identification of emergency hospital services.
- A specific listing of all personnel to be used on the project by the contractor including verification by EG&G of all required training.
- Clarification of the contractor's air monitoring responsibilities.

- Verification and approval of the contractor's PPE program.

The EG&G-approved health and safety plan for OU2 must be reviewed by all site personnel in conjunction with this PSHSP. It includes sections on:

- EG&G Policy for environmental restoration work conducted at OU2.
- Description of specific locations within OU2.
- Assignment of EG&G health and safety personnel and responsibilities.
- Hazard assessment of OU2 locations including chemical, radiological, physical, and mechanical hazards.
- The EG&G hazard communications program.
- Site control requirements.
- Personal protective equipment (PPE) requirements.
- Decontamination procedures.
- Medical Surveillance.
- Air monitoring, training, and emergency response requirements.
- Material handling.

Details of the work to be conducted are described in the "*In Situ* Volatilization Pilot Test Plan – East Trenches Area" (EG&G, October 1992). A summary of the areas in which the soil vapor survey will be conducted is included in Section B 3 of this PSHSP. Section B 4 summarizes the ISV tasks and methods used and the potential hazards present. Additional sections of this PSHSP describe the contractor's health and safety action plan including the elements of site control, PPE, decontamination, medical surveillance, air monitoring, training, and emergency response.

The EG&G project manager is Responsible for enforcing the PSHSP. The primary subcontractor and all lower tier subcontractors are responsible for complying with the PSHSP.

SECTION B 2
IN SITU VOLATILIZATION (ISV) PERSONNEL

The following personnel have been assigned to this project. Descriptions of the responsibilities of these positions are included in the approved Health and Safety Plan for OU2 (EG&G, 1991).

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Subcontractor Project Manager

To be determined

Subcontractor Site Health and Safety Coordinator

To be determined

Subcontractor Health and Safety Specialist

To be determined

Subcontractor Field Equipment Operators

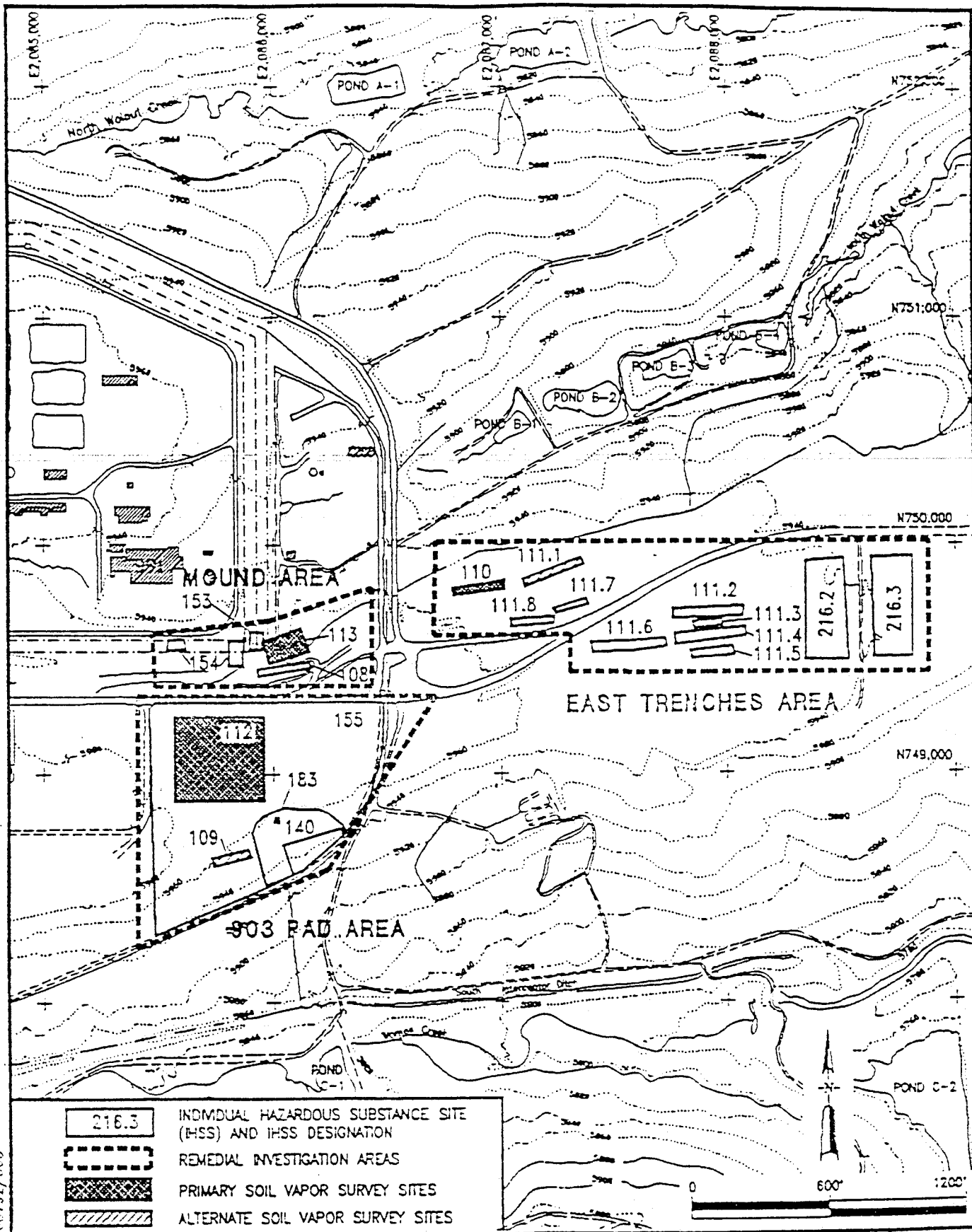
To be determined

SECTION B 3 SITE DESCRIPTION

The *in situ* volatilization (ISV) pilot testing will be initially conducted adjacent to an Individual Hazardous Substance Site (IHSS) within OU2 known as IHSS No. 111.1 (Figure B 3-1). This site is also known as Trench T-4 and is described in detail in Sections 1 and 2 of the "ISV Pilot Test Plan" preceding this PSHSP.

In brief, it is expected that carbon tetrachloride, chloroform, tetrachloroethylene (PCE), trichloroethylene (TCE), and 1,1,1-trichloroethane (TCA) comprise the majority of released VOC contaminants at the ISV site. Inorganic contaminants may include uranium, plutonium, americium, and several heavy metals including beryllium.

R37078 MIMB100792/600



U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant
Golden, Colorado

SOIL VAPOR SURVEY SITES
OPERABLE UNIT NO. 2

FIGURE
B3-1

SECTION B 4

IN SITU VAPORIZATION (ISV) METHODS AND TASKS

ISV methods are described in detail in Sections 2 and 4 of the ISV Test Plan preceding this PSHSP. ISV is a relatively new hazardous waste treatment technology that offers an alternative to the conventional excavation, treatment, and disposal approach. ISV removes volatile contaminants from the subsurface by mechanically drawing air through pore spaces in the soil. The flow of air through unsaturated soil pores enhances volatilization of organic compounds and results in movement of organic vapors through the soil to extraction vents. The extraction vents are connected to a blower system which draws the contaminant-laden air stream to the surface. The air stream is typically treated for removal of harmful contaminants prior to discharge to the atmosphere. A typical schematic diagram of a single extraction vent system is presented in Figure B 4-1.

The following tasks have been identified for the purpose of health and safety risk analysis:

- | | |
|--------|---|
| Task 1 | Drilling and sampling |
| Task 2 | Construction of the ISV system |
| Task 3 | Operation of the ISV system |
| | <ul style="list-style-type: none">• Groundwater extraction• Extraction venting |

Most of the drilling (Task 1) will be performed using a truck-mounted, hollow stem auger drilling rig. However, drilling for the installation of surface casing may be conducted using a solid stem, continuous flight or bucket auger. Undisturbed soil samples will be collected continuously during hollow stem auger drilling. The samples will be collected using a "California" ring sampler. The sampler will be driven ahead of the auger to the desired depth with a standard 140-pound slide hammer falling freely from a height of 30 inches. The sample will be brought to the surface and removed by opening the sampler along its length or by using an extruder. Soils will be extruded from the appropriate sampling rings, placed on clean butcher or kraft paper and divided so that no clumps remain. Soil samples will be submitted to a laboratory for VOC and radionuclide analysis.

Figure B 4-1

In general, construction (Task 2) will involve the ordering and delivering of the necessary components; drilling of wells for and installation of groundwater extraction pumps; drilling for and installation of various air extraction and air injection vents; installation of various pressure monitoring probes; and assembly of various piping, blower, granular activated carbon (GAC), HEPA filtration, monitoring, tank storage, and power systems.

Once the ISV system is constructed, operations (Task 3) will involve inspection and maintenance of its components; collection, storage, and transportation of potentially contaminated groundwater; and extraction of contaminated soil vapor to the GAC adsorption units.

SECTION B 5

HAZARD ASSESSMENT

Potential physical, chemical, and radiological hazards that may be encountered during work within OU2 are described in detail in the EG&G HASP (EG&G, 1991). This section will summarize the specific hazards expected to be encountered during the ISV Pilot Study.

5.1 PHYSICAL HAZARDS

<u>TASK</u>	<u>HAZARD</u>	<u>MEASURES OR CONTROLS TO REDUCE HAZARD</u>
(1) Drilling / Sampling	Noise	Noise exposure may occur during the various drilling and sampling activities. Prior to any activity hearing protection will be donned and noise monitoring will be conducted during the initial activities. If noise exposures exceed 85 dBA, hearing protection will be required; if not, hearing protection can be removed.
	Pinch Points	The SHSC will identify drilling and sampling related pinch points, and will train sampling personnel in safe work practices. The drillers will demonstrate that a kill switch is operational.
	Material Handling	The SHSC will identify items such as augers, core boxes, and other materials which may present lifting/material handling stress and will train drillers/samplers in proper techniques. Site personnel will wear safety shoes to protect their feet.
	Overhead	All individuals within a distance equivalent to the height of the boom on the drilling rig will wear a hard hat when the drilling rig is on-site.
	Trip/Fall	Pre-designated routes will be established to prevent trips and falls. Safe housekeeping and material handling techniques will be stressed. Tripping hazards presented by the terrain will be identified and communicated to drillers/samplers.
	Electrical	Drillers/samplers will be trained in electrical safety. Ground fault interrupters will be used with all electrical generators and electrically powered equipment.

<u>TASK</u>	<u>HAZARD</u>	<u>MEASURES OR CONTROLS TO REDUCE HAZARD</u>
Drilling and Sampling Continued	Cold Stress	Drillers/samplers will be trained in the symptoms of cold stress. Warm PPE will be worn if temperatures drop below 55 degrees F and PPE will be changed if it gets wet. Direct contact with cold surfaces and air will be avoided. Extra breaks to warm areas may be needed on days below 40 degrees F.
	Heat Stress	If outside temperatures exceed 70 degrees F, driller/samplers will have radial pulse monitored for 30 seconds as early as possible in the resting period. If the heart rate exceeds 110 beats per minute, the next work period will be shortened by 33%. If the heart rate exceeds 110 beats per minute at the beginning of the next rest period, the following work cycle will be further reduced by 33%. Plenty of cool water or other non-caffeinated drinks shall be available. The SHSC shall observe field personnel for symptoms of heat stress.
	Buried Drums	Screening with a magnetometer or equivalent shall be done to identify the presence of buried drums. Drilling/sampling shall not be attempted above such areas. All intrusive activities shall proceed with caution and will be aborted in locations where buried drums are encountered.

<u>TASK</u>	<u>HAZARD</u>	<u>MEASURES OR CONTROLS TO REDUCE HAZARD</u>
(2) Construction	Noise	Noise exposure may occur during the various drilling and sampling activities. Prior to any activity hearing protection will be donned and noise monitoring will be conducted during the initial activities. If noise exposures exceed 85 dBA, hearing protection will be required; if not, hearing protection can be removed.
	Pinch Points	The hazard related to pinch points during construction is considered to be significant. It shall be controlled as discussed above.
	Material Handling	Proper lifting and carrying techniques will be stressed by the SHSC. Devices which minimize physical stress, such as hoists and carts, will be used when feasible.
	Overhead	Hard hats will be required during construction by all individuals in the area of construction.
	Trip/Fall	Shall be controlled as discussed for Task 1 above.
	Electrical	As per Task 1 above.
	Cold Stress	Shall be controlled as discussed above.
	Heat Stress	As per Task 1 above.
	Buried Drums	As per Task 1 above.
	Flammable Gases	The handling, storage, and use shall be per OSHA and DOT standards. Cylinders shall be secured and non-sparking tools will be used.
(3) ISV Operations	General	Hazards and control measures for Task 3 are, in general, the same as for Task 2. Buried drum and overhead hazards are not expected to be significant for Task 3. If noise exceed 85 dBA, efforts to dampen/control the pump and blower motors will be made, and hearing protection will be required. Other hazards for Task 3 are listed below.

<u>TASK</u>	<u>HAZARD</u>	<u>MEASURES OR CONTROLS TO REDUCE HAZARD</u>
ISV Operations (continued)	Transportation	Since potentially contaminated ground water will be collected and transported to an RFP treatment facility, typical risks associated with motor vehicles and accidental spills exist. The SHSC shall insure that all drivers are trained in vehicle safety and spill reporting. Periodic audits/inspections will be made to check the adequacy of vehicle and transfer hose maintenance, compliance of drivers with RFP transportation regulations, and adequacy of vehicle safety procedures (such as using wheel chocks or other vehicle restrain methods when loading and unloading tank trucks).
	Explosive/ flammable vapors	This is not expected to be a significant hazard for the ISV since the primary soil contaminants are non flammable chlorinated compounds. However, flammable compressed gases used by the gas chromatograph or during system maintenance (for example, if cutting or welding gases are used) will be used/stored in accordance with OSHA and DOT regulations.

A survey of both above ground and underground utilities will be conducted prior to any drilling. Minimum clearances required when working near energized overhead power lines are as follows:

- o 10 feet from a 50 kilovolt (KV) or less line
- o 20 feet from a 50 KV to 345 KV line and
- o 34 feet from a 345 KV to 750 KV line

Prior to the commencement of work, the driller needs to ensure that there is enough room for the mast to be raised safely. The minimum safe overhead clearance is equal to the maximum mast height plus 5 feet. If buildings or pipes are overhead, additional height could be required to provide safe clearance while raising A-rods and augers above the mast height. The team leader should coordinate with the drilling company to determine clearance requirements for specific drill rigs to be used.

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The Administrative Record Staff

5.2 CHEMICAL HAZARDS

The major chemical contaminants present in the soil at OU 2, permissible exposure limits (PEL), the most important exposure routes, and the major symptoms of exposure are summarized in Table 5-1.

Air monitoring during soil vapor sampling for volatile organics will be performed by the SHSC with a Photoionization Detector (PID) or a detector tube system for carbon tetrachloride, and chloroform. Beryllium is the most toxic metal present within OU2. The highest level of beryllium found within OU2 is 15 $\mu\text{g}/\text{kg}$ of sediment (EG&G, 1991). Therefore, if all the particulate in the air were from this highest source, there would still need to be 133,000 mg/m^3 of dust in the air to reach the PEL of 0.002 mg/m^3 beryllium. 15 mg/m^3 of particulate is a dense dust cloud. This means that it will be literally impossible for ISV technicians to exceed the risk exposure limits to beryllium. Although overexposure to airborne contamination is unlikely, the ISV technicians shall stay on the upwind side of the drill rig to further reduce exposure potential. To identify the wind direction a wind sock, piece of banner tape or other suitable lightweight material will be placed on a pole at a height of approximately 5.5 feet above the ground. The wind direction can then be determined by observing the device.

Table 5-1
Chemical Hazards

Chemical Name	PEL	Route of Entry	Symptoms of Exposure
Carbon tetrachloride	2 ppm	Inh., Abs., Ing., Con.	CNS depression, nausea, liver/kidney damage.
Chloroform	2 ppm	Inh., Ing., Con.	Irritate eyes, skin; dizziness, nausea, headache, fatigue, liver damage, cancer.
Methylene Chloride	500 ppm	Inh., Ing., Con.	Fatigue, lightheadedness, nausea, numbness in limbs, eye irritation, (Cancer)
Trichloroethylene	50 ppm	Inh., Ing., Con.	Headache, dizziness, visual disturbance, nausea.
1,1,1-Trichloroethane	350	Inh., Ing., Con.	Headache, CNS depression, irritate eyes and skin, irregular heart beat.
Tetrachloroethylene	25 ppm	Inh., Ing., Con.	Irritate eyes, nose, throat; nausea, CNS depression, decreased alertness, headache, liver damage (cancer).
Beryllium	0.002 mg/m ³	Inh.	Respiratory irritation, weakness, fatigue, weight loss, cancer.

Key: Abs - Skin Adsorption
 Inh - Inhalation
 Ing - Ingestion
 Con - Skin and/or eye contact
 CNS - Central Nervous System
 PEL - OSHA permissible exposure level

Monitoring of the ambient environment for volatile organic compounds (VOCs) has been conducted during recent drilling operations at OU 2. The results listed below (Table B5-2) are the maximum ambient levels detected during drilling in 1991 in the areas where the SVS will be performed:

Table 5-2
Total Volatile Organic Concentrations
From Recent Drilling Activities
At Operable Unit 2

<u>Well No.</u>	<u>IHSS No.</u>	<u>Total VOC Concentration (ppm)</u>
20191	111.1	1 ppm
08591	111.5	1-3 ppm
07391	109	3-5 ppm
09991	113	3 ppm
10191	110	8-10 ppm
10291	111.1	15 ppm

5.3 RADIOLOGICAL HAZARDS

Five radionuclide contaminants may be present in particulate form during the ISV pilot study. These five are uranium-238, uranium-235, uranium-234, plutonium-239; and americium-241. The primary type of radiation of concern relative to particulate exposure is "alpha" radiation. Alpha radiation presents an internal hazard when radionuclides in particulate form are inhaled or ingested. The relatively large amount of ionization occurring in a small volume from alpha particulates inside the body is typically 20 times more damaging than ionization caused by X-ray or gamma radiation. Radiation exposure is reduced when the concentration of the radionuclides in the soil is low or the potential for the material to become airborne is low (EG&G, 1991).

The risk of radiation uptake from inhalation during conduct of the ISV is expected to be low because it is distributed throughout large volumes of soil (EG&G, 1991). The risk of uptake

through ingestion is also low and can be further minimized by following good hygienic practices such as wearing gloves, washing hands after working around contaminated soil, and not smoking, drinking, or eating in or around the contaminated areas. The highest potential for contamination occurs within 1 foot of the contaminated soil.

Since the exposure to radiation can cause serious health effects, it is important to assess the amount of these materials present and the potential for exposure during work operations. Plutonium-239 is the most hazardous radionuclide present in the ISV soils. If adequate protection is taken for plutonium, protection will also be adequate for other alpha emitting radionuclides (EG&G, 1991).

The derived air concentration (DAC) is the concentration of a single radionuclide in air, which if inhaled over a 1-year period would irradiate a person to the occupational exposure limit of 5 rem per year. In general, 1/10 of the DAC is the action level for upgrade to a full-face respirator.

5.3.1 Radiological Monitoring and Screening

Radiological monitoring and screening will be conducted by the HSS. Radiation meter deflections above background will be logged/recorded. Radiation levels which exceed 5 mrem/hr signify radiation exposure. Table B 5-3 shows the information that will be used to ensure that airborne concentrations are maintained below the DAC during field operations. This procedure was developed by RFP Environmental Restoration personnel and will be implemented by the subcontractor in the areas of suspected contamination of soils (EG&G, 1991).

Sampling technicians will also be "frisked" with the Ludlum 12-1A prior to leaving any area suspected of containing radiological hazards. All radiation monitoring shall be conducted in accordance to EMRG 1.3,2.1,3.1,and 3.2. Likewise, all instrumentation for radiological monitoring will be in accordance to the EMRG.

Table B 5-3

**Local Air Monitoring Trigger Levels
for ²³⁹ Plutonium in Soils**

Soil Activity pCi/gram	1.8 Rem/yr. TSP mg/m ³	DAC/10 TSP mg/m ³
0.001	1,060,500	2,000,000
0.01	106,050	20,000
0.1	10,605	2,000
1	1,061	200
5	212	40
10	106	20
20	53	10
40	27	5
60	18	3
80	13	3
100	11	2
200	5	1
400	3	0.5
600	2	0.3
800	1.3	0.3
1,000	1.1	0.2
1,500	0.7	0.13
2,000	0.5	0.10
5,000	0.2	0.04
10,000	0.1	0.02
20,000	0.05	0.01
50,000	0.02	0.004
80,000	0.013	0.003
100,000	0.011	0.002

Trigger levels are for Total Suspended Particulate matter (TSP) concentrations measured in the breathing zone as 8-hour, time-weighted averages. They are based on (1) the Derived Air Concentration (DAC)/10 which DOE recognizes as the criteria for implementing respiratory protection and (2) the RFP ALARA based recommended annual committed effective dose equivalent of 1.8 Rem/year.

Use of the Table B 5-2

- 1) Identify the approximate soil activity in the area where intrusive activities are to be conducted.
- 2) Identify the corresponding DAC/10 and annual committed effective dose equivalent (i.e., 1.8 Rem/yr.) trigger levels. Those values represent total suspended particulate (TSP) concentrations that trigger the following actions:
 - A) Donning respiratory protection equipment: DAC/10 threshold.
 - B) Stop intrusive actions and reevaluate the activities, conditions, and precautionary requirements: 1.8 rem/yr TSP threshold.
- 3) Measure TSP breathing zone concentrations during intrusive activities using a Piezometric Balance, Mini-RAM, or comparable real-time instrument.
- 4) If measured TSP concentrations attain the trigger levels identified above, for a sustained period of time (15-30 minutes), such that the 8-hour time-weighted average could be approached, follow the appropriate requirements identified above (A or B) and notify the SHSC.
- 5) RFP practice dictates that reasonable measures be taken to keep exposures to radionuclides as low as reasonable achievable (ALARA). Routine dust avoidance procedures such as avoiding the dust plume path should be implemented, to the extent practicable, regardless of the TSP measurements.
- 6) Environmental concentration measurements and estimates can vary at a given location. Thus, users of this table are encouraged to exercise conservative judgment regarding the selection of trigger levels.

Source: EG&G, Industrial Hygiene.

A HSS that is familiar with how to operate the radiological monitoring equipment will be present at each activity that requires radiation monitoring. The HSS are considered to be semi-skilled radiation monitors and will conduct day-to-day monitoring activities, immediately implement the action levels in Section B 6 and notify the EG&G Health and Safety Liaison (HSL) of all monitoring results. Arrangements for a RFP Radiation Protection Technician (RPT) to verify any of the HSSs radiation monitoring results that indicate the presence of greater than 250 counts per minute (cpm). An RPT will have in depth familiarity and experience in radiation monitoring.

~~Surfaces that could have contamination present shall be decontaminated in accordance to the Field Operations SOP FO.03 on that subject. The contamination limits from the Rocky Flats Health and Safety Practices Manual (HSP) are listed in Table B5-4. The release of property shall be conducted in accordance to Radiological Engineering 1003, EMRG 3.2 and HSP 18.10.~~

5.3 BIOLOGICAL HAZARDS

Snakes, arachnids, and insects are the major biological hazards that may be encountered at the RFP. Care should be taken when performing field work at the facility. Wearing hightop work boots will provide some measure of protection. Leather work gloves are also recommended when handling items on or near the ground. In the unlikely event of a snake bite or other bite, the following procedures should be followed.

- Call an emergency medical service or get the victim to a medical facility as soon as possible.
- Keep victim calm and still. Snakebite reactions are aggravated by anxiety and fear.
- Keep bitten area below level of heart, if possible, and keep it immobile.
- Treat for shock, if necessary.
- Give mouth-to-mouth resuscitation if breathing stops.
- Begin cardiopulmonary resuscitation (CPR) if breathing and heartbeat stop.

Table B 5-4
Radioactive Contamination Limits
 (From HSP 18.10)

NUCLIDE (See Note)	REMOVABLE (dpm/100 cm ²)	TOTAL (FIXED + REMOVABLE) (dpm/100 cm ²)
U-natural, U-235, U-238 and associated decay products	1,000 alpha	5,000 alpha
Transuranics, Ra-226, Ra-228, Th-230, Pa-231, Ac-227, I-125, I-129, Plutonium, Americium	20	500
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	200	1,000
Beta-gamma emitters (nuclides with decay modes of other than alpha emission or spontaneous fission) except Sr-90 and others noted above. Includes mixed fission products containing Sr-90.	1,000 beta-gamma	5,000 beta-gamma
Tritium organic compounds, surfaces contaminated by HT, HTO, and metal tritide aerosols	10,000	10,000

Note: Use of the above limits when performing radiological surveys for unrestricted or conditional use. If the surface contamination levels exceed the limits of the above table, the item is considered radiologically contaminated. If surface contamination levels are equal to or less than the limits in the above table the item is considered acceptable for unrestricted release. The values in this table apply to radioactive contamination deposited on, but not incorporated into the interior of the contaminated item. Where contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for the alpha- and beta-gamma-emitting nuclides apply independently.

- Do not give victim aspirin.
- Do not use ice on the bite.

Mortality rates of rattlesnake bite victims are low, but crippling injuries can result. Medical care should be sought even if the victim shows no adverse reactions.

The following biological hazards could be encountered in the field and precautions should be taken to protect field personnel:

Prairie Rattlesnake: The prairie rattlesnake generally has brown blotches giving way to crossbands on its tail. The blotches are usually well defined and the entire body has a greenish cast. Another characteristic of rattlesnakes is interlocking joints at the end of the tail that make a sharp rattling noise when shaken. Field personnel need to be aware that snakes could be in the area and should exercise caution when working in undisturbed areas and locations with animal dens. Extra care should be taken around rocks, particularly those with overhangs. rattlesnakes are generally timid and will not attack unless disturbed.

Black Widow Spiders: The black widow spider has a black shiny body about the size of a pea. The abdomen is the shape of a sphere and there is a red or yellow hourglass-shaped mark on the underside of abdomen. There are usually found in shady areas or under rocks and wood. It weaves shapeless webs in undisturbed areas. A bite could result in severe pain, illness, and possible death from complications, but not usually from the bite itself.

Scorpions: There are several types of scorpions native to Colorado. Scorpions can be green or brown to yellowish in color and range from 1/2 inch to 8 inches in length. Their bodies are divided into two parts - a short, thick, upper body and along abdomen with a six-segmented tail with venomous sting at the end. A scorpion has six pairs of jointed appendages -- one pair of small pincers, one pair of large claws, and four pairs of jointed legs. They are most active at night. A scorpion sting is very painful , but usually will not result in death.

Wood Ticks: Although wood ticks are arachnids, they lack the indication of segments. Ticks are external blood feeding parasites. Bites from tick could result in the transmission of Rocky Mountain Spotted Fever, a serious and possibly fatal disease. The *Rickettsia* virus infects wood ticks, mostly in the late spring and early summer. It is characterized by chills, fever, severe pain in leg muscles and joints, and a body rash. Personal protective equipment can offer some protection, but the use of insect repellent on outside clothing could also be warranted. Field personnel should search their bodies at the end of each day to check for ticks and chiggers.

Violin Spider: Also known as the "Brown Recluse Spider". These spiders are 1/4 to 3/8 inches in length. The bases of its legs are orange -yellow with the rest of the legs grayish to dark brown. The abdomen is grayish to dark brown with no obvious pattern. Each foot has two claws. Its habitat is in cornered areas. These spiders sometimes take refuge in towels or articles of clothing. Their venom is particularly poison to people and the wound commonly develops a crust which falls off leaving a deep crater which does not heal for months.

Other biological hazards include chiggers, wasps, bees, and poison ivy. Bees and wasps are especially dangerous to people who have allergic reactions to their venom. Workers who are sensitive to insect stings are responsible for notifying the Site Health And Safety Officer, the Health And Safety Specialist, the field team leader, and the project manager prior to the commencement of field work.

NOTICE:

“BEST AVAILABLE COPY”

**PORTIONS OF THE FOLLOWING
DOCUMENT ARE ILLEGIBLE**

The Administrative Record Staff

SECTION B 6 MONITORING

The following Table B 6-1 indicates the air and personal monitoring instruments, frequency of monitoring, action limits, and action required for all work conducted as a part of the ISV.

Table B 6-1

Instrument	Frequency	Action Limit	Action
Photoionization Detector (PID, HNu 11.7 eV lamp or equivalent) or Detector Tube for Carbon Tetrachloride and Chloroform	(H + D)	0-1 ppm	Level D, no respiratory protection required to be worn.
		1-10 ppm	Use detector tubes to check for presence of carbon tetrachloride and chloroform; if carbon tetrachloride and/or chloroform are > 1 ppm then withdraw from site or go to Level B protection. If not, Level C respiratory protection required. Respirator equipped with combination cartridge approved for organic vapors (OV) and high efficiency particulate air filter (HEPA).
		> 10 ppm	Withdraw from site or go to Level B protection.
TLD Badge	(C)		Normal TLD badge use.
Ludlum Model 12-1A	(H + D)	> 250 counts per minute	don level C PPE and notify HSL.
Mini-RAM	(H + D)	> 2.5 mg/m	Stop work. Call radiation protection technician (RPT). Trigger level based on annual committed effective dose equivalent of 1.8 Rem/yr. assuming worst-case soil level of 500 pCi/g plutonium.
		> 0.4 mg/m ³	Level C respiratory protection required.
		< 0.4 mg/m ³	Respirators not required.
Pulse Check (heat stress)	(H)	50-110 bpm	Continue work. If approaching 110 bpm, reduce work load to minimize heat stress.
		> 110 bpm	No field work permitted. Rest in cool location. Drink cool fluids.

(H + D) is hourly plus more frequent monitoring during activities which disturb the soil.
 (C) is continuous monitoring.
 (H) is hourly monitoring.

In addition to the above monitoring equipment, an oral thermometer shall be kept on-site to monitor body temperature. In particular, to check for heat or cold stress.

SECTION B 7

EXPOSURE SYMPTOMS AND ACTION REQUIRED

Specific exposure conditions/agents, warning symptoms, and actions required during this ISV project if warning symptoms are encountered are specified in Table B 7-1. Actions required if radiation or chemical exposures occur are given in Sections B 5 and B 6.

Table B 7-1

Condition/ Agent	Warning Symptoms	Action Required
Pre heat stress	Headache Pulse over 110 bpm	Check pulse. Rest and drink cool fluids until heart rate is below 110. Increase frequency of breaks and increase cool water intake.
Heat cramps	Cramps Exhaustion Dizziness	Move to cool place. Give cool fluids to drink. Massage cramping area. Withdraw from field work for minimum of 1 day.
Heat exhaustion	Rapid breathing Weak pulse Cold, clammy skin Heavy perspiration	Move to cool place. Make patient rest. Remove PPE. Give cool fluids to drink. Withdraw from field work for a minimum of 2 days.
Heat stroke	Pulse over 110 bpm Hot, dry skin Dilated pupils disorientation	Remove PPE. Cool rapidly using cool–NOT COLD–water. Treat for shock. TRANSPORT TO HOSPITAL. LIFE THREATENING: Doctor must provide written permission for return to work.
Frostbite	Gray, blanched skin Numbness	If medical attention is not available, the affected area should be carefully warmed. If warming is done, it should be done by immersing the affected area in water that is approximately body temp. (100-105°F). Do not allow the affected body parts to touch the sides or bottom of the container (bath tub). Do not place pressure on the affected area. The presence of pain is an indicator of successful rewarming. Wrap rewarmed area in gauze and transport to hospital for treatment.
Hypothermia	Shivering Body temperature below 95.6°F	SEEK MEDIAL ATTENTION IMMEDIATELY , if not readily available, remove wet clothing, dry the person, keep victim at rest, slowly warm core without warming legs, give warm (not hot) liquids if person is conscious, transport to hospital as soon as possible.
Radiation	No exposure symptoms expected	Trace quantities of americium, plutonium, tritium, and uranium may be present as soil and groundwater contaminants. Based on maximum soil contaminant concentrations found in nearby areas, resuspended dust is not expected to exceed regulatory limits for airborne radiation. See Sections B 5 and B 6 for action limits
Chemicals	No symptoms expected	Airborne contaminant concentrations are expected to remain well below occupational exposure limits. No exposure symptoms are therefore expected. Exposures above the PEL may produce headache, nausea, dizziness. Irritation of eyes, nose and lungs. See Section B 5 and B 6 if action levels are exceeded.

SECTION B 8

PERSONAL PROTECTIVE EQUIPMENT

Work on this project will begin in level C protection. Upgrading to level B protection or downgrading to level D protection will proceed depending on how air monitoring results compare to action levels identified in Section B 6. Table B 8.1 specifies PPE required.

Table B 8-1

Item	Comment
Respiratory Protection	Full-face air purifying respirators (manufacturers: MSA or AO) when action levels or conditions dictate the use. Initial drilling/sampling (Task 1), construction (Task 2), and ISV operation (Task 3) will be done using respirators in Level C PPE. PPE can be downgraded to Level D (no respirator) if action levels are not exceeded. If monitoring results indicate that organic vapors exceed 10 ppm and/or the detector tubes indicate a concentration of 1 ppm carbon tetrachloride and/or PCE, withdraw from site or go to level B protection.
Respirator Cartridges	Use organic vapor and high efficiency particulate filter cartridges (OV/HEPA) when Level C respirator required. Cartridges to use: AO = R53HE and MSA = GMA-H.
Boots, safety (leather) steel toe, steel shank	OSHA requirement
Gloves (leather)	To prevent potential for direct contact with radiological wastes.
Inner gloves (Nitrile)	To provide added protection.
Coveralls (Saranex or poly-coated Tyvek)	Potential for radiological contact during ISV is considered to be low. To protect against potential contact, chemical resistant disposable clothing will be worn during Tasks 1 and 2. The need for chemical resistant clothing during Task 3 will be determined on the basis of monitoring by the SHSC.
Eye wash	Eye wash solution shall be available at ISV test location to perform initial flushing if necessary. Can transport to RFP medical clinic in immediate vicinity for remainder of 15 minute flushing or further first aid/medical attention if needed.
First Aid Kit	Contains antiseptic spray, sterile eye wash, 1" x 5-yd. roller bandage, 1½" x 2" gauze pads, 1½" x 5-yd. spool of tape, aspirin, clean wipes, ice pack, ammonia inhalants, tweezers kit, triangular bandage, plastic bandage, compress, finger bandages, knuckle bandages, and first-aid book.

SECTION B 9

WORK ZONES

The ISV site will be divided into three basic zones: 1) Exclusion Zone, 2) Contamination Reduction Zone, and 3) the Support Zone. The Exclusion Zones (EZ) include areas of high physical, chemical, or radiological hazards. Only authorized personnel are permitted within the exclusion zones. Examples of exclusion zones are a 4-foot radius around a rotating auger, and areas where respiratory protection is required. The exclusion zone will be clearly marked with traffic cones, survey flags, banner tape, or other high visibility markings.

The Contamination Reduction Zone (CRZ) or decontamination area is the corridor through which all authorized personnel may enter or exit from the exclusion zone. The CRZ contains decontamination equipment and containers for disposable outerwear, etc. The CRZ is located on the upwind side of the EZ. Entrances and exits are clearly marked with high visibility items such as traffic cones.

The Support Zone (SZ) contains personnel who perform support functions for the physical work and a break area. It is upwind of the CRZ. Managers, spare equipment, etc., are generally located in the SZ. All personnel exiting the EZ must be decontaminated prior to entering the SZ. Heat stress monitoring is performed in the SZ.

Contamination prevention techniques will be used wherever feasible. Monitoring equipment will be wrapped in plastic to prevent possible contamination and to minimize decontamination, to the extent possible, without interfering with their function. The plastic will be discarded as contaminated waste after each day's use.

Engineering controls will be used first, wherever feasible, followed by a combination of administrative and personal protective equipment controls. The possibility of significant dust generation during ISV is considered to be low.

ISV technicians will be wearing full-face respirators at the beginning of work until monitoring confirms that they are no longer needed. PPE will be used when other controls are not feasible or will not adequately control potential exposures.

All equipment to be used by personnel will be checked to ensure proper function and to make sure that all calibration/safety checks have been performed to manufacturer's specifications prior to use in the field. Testing of the breathing zone atmosphere is required for OSHA documentation. If special hazards are identified, appropriate equipment must be selected to assess the hazard level. The instruments selected must detect all suspected hazards, substances, agents, or materials of concern (radiation, VOCs, and dust/particulate hazards).

Equipment and instrument calibration, safety and function checks, and the daily safety briefings will be documented in the field logbook. Incidents, exposures, accidents, and other health and safety problems or conversations relating to field activities will also be documented.

Only authorized personnel are permitted to enter the EZ. Authorized personnel are those preapproved personnel, named in this PSHSP, who are needed in the EZ to perform essential site functions.

Additionally, in Radiological Controlled Areas (RCAs) a Radiological Work Permit is required. All work in the RCA shall be done in accordance to EMRG 1.3.

SECTION B 10

DECONTAMINATION

10.1 PERSONNEL

Discard disposable outerwear.¹ Wash exposed skin with soap and water. Rinse with water.

10.2 FIELD MONITORING EQUIPMENT

Remove and dispose of plastic wrapping. All potentially exposed surfaces will be wiped with a cloth dampened with soap and water after each use and housed in a trailer on the RFP site. Effectiveness of decontamination will be checked by frisking or wipe testing each instrument. Contaminated equipment is not permitted to be stored in general use areas or to leave the site. Decontamination wash and rinse water will be disposed of in the client's approved disposal area or as stated in the contract.

10.3 EQUIPMENT

Rental equipment will be washed and wipe tested for removable surface contamination. Equipment will not be removed from the site until RFP determines that it is safe for use by the general public (obtain written RFP approval). A copy of the RFP approval will be maintained in the project file.

All equipment, regardless of ownership, shall be monitored in accordance to RFP Safety Standards per the Rocky Flats Health and Safety Practices Manual Section 18.10 and Department Of Energy Orders 5480:11 before leaving plant site.

¹Solid wastes will be placed in a plastic bag, labelled and transferred to RFP for proper disposal. Liquid wastes will be containerized and transferred to RFP for proper disposal.

10.4 VEHICLES

Vehicles used in potentially radioactive areas will be surveyed for radioactive contamination prior to leaving the RFP facility. Vehicles must meet facility decontamination standards before exiting the site (obtain written RFP approval).

SECTION B 11

TRAINING REQUIREMENTS

All field personnel will have completed and be current in the training specified in 20 CFR 1910.120. This training includes, but is not limited to:

- 40-hour Hazardous Waste Site Worker Training

- 8-hour annual refresher training

- 8-hour supervisory training (field supervisors only)

- 24-hour on-the-job training

- 8-hour Environmental Restoration Radiation Worker Safety Training

The 8-hour Environmental Restoration Radiation Worker Safety Training is a requirement for all field personnel. It is specialized training given at RFP specifically for personnel in the field performing environmental work who could potentially be exposed to sources of ionizing radiation.

In addition to the above training, the SHSC needs to train all personnel working in the field on pinch points, material handling hazards, and other hazards listed in Section 5.0. All training must be documented and copies of the documentation must be both supplied to EG&G Rocky Flats and must kept in the field in an accessible location.

Table B 11-1

Personnel Training

	Medical Clearance	OSHA 40-hour Training	OSHA Supervisory Training	First Aid	CPR
PROJECT MANAGER TBD	X	X		X	X
TASK MANAGERS TBD	X	X	X	X	X
FIELD STAFF TBD	X	X		X	X
TECHNICIANS TBD	X	X		X	X

34

SECTION B 12

MEDICAL MONITORING REQUIREMENTS

All field personnel are participants in a medical monitoring program which fulfills the requirements of 29 CFR 1910.120. The program includes:

Baseline Medical Examination

Annual Medical Examination

Exit Medical Examination

Incident Specific Examination

~~Bioassay For Radiological Constituent~~

A written copy of this PSHSP must be present on site. The contents of this PSHSP must be discussed, and understood by all personnel prior to beginning each day's work (site safety briefing). A final visual and paperwork check of site hazards will be made to ensure that all safety concerns have been addressed.

SECTION B 13

CONTINGENCY PLANS

The concentrations of chemical and radiological contaminants are suspected to be low. Site emergencies are therefore expected to be limited to the slip, trip, fall, cut, and abrasion variety. The highest potential for injuries is expected to occur during drilling and construction operations (material handling).

If emergencies arise, the injuries will be stabilized using standard first aid practices. All injuries will be documented in the field logbook and reported to the contractors project manager and/or SHSC. Minor injuries and cuts will be treated by the field workers using basic first aid procedures and materials. Additional medical attention will be sought if the worker's injury requires more than basic first aid measures or the condition worsens.

Injuries which require more than simple first aid measures will be treated by medical personnel (at the RFP or through the prearranged medical hospital or clinic as stated below).

- Exposures or suspected exposures to chemical or radiological hazards will be taken seriously. If treatment is required, the individual will be taken to a hospital without delay. Effective diagnosis and treatment sometimes require the individual to be tested within hours of the suspected exposure. After rendering first aid and transport to the medical facility, the exposure will be reported to the contractor's project manager or SHSC as soon as possible.
- If a chemical gets in the eyes, first flush eyes with emergency eye wash. Phone emergency response personnel and transport to medical clinic and flush eyes with water for 15 minutes. Remember to occasionally lift the upper and lower lids during flushing.
- If a chemical gets on the skin, flush the affected skin with water for 10-15 minutes. Phone emergency response personnel.
- If a chemical is ingested, call emergency medical personnel.
- If a chemical is inhaled, move the victim to fresh air at once. Phone emergency response personnel.

Ambulance: Building 331 - Phone: 2911 RFPFD
Hospital: Phone: 2911 or Hospital TBD
Police: Phone: 2911
Fire: Phone: 2911

EMERGENCY CONTACT PHONE NUMBERS

EG&G Emergency Coordinator _____
TBD

EG&G Project Manager (303) 966-6954 _____
James P. Koffer

Contractor Project Manager _____
TBD

Contractor Health & Safety _____

Coordinator (TBD) _____

SECTION B 14
UNDERSTANDING AND COMPLIANCE STATEMENT

The undersigned persons understand the provisions of this safety plan and agree to abide by its provisions:

Name Lettered

Signature

Date

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

SECTION B 15

REFERENCES

EG&G. 1991. Final Health and Safety Plan for Phase II RCRA Facility Investigation/Remedial Investigation at the 903 Pad, Mound, and East Trenches Areas.

APPENDIX B-1
ROUTES TO HOSPITAL
To be determined